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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

A SCIENCE SERVICE PUBLICATION

One of a series

New Light on a Compound Semiconductor

Pictured is a new and unusual transistor . . . made from a *compound* semiconductor. Its electronic properties are greatly affected by *light*. It is a *field-effect* transistor having input impedances up to 100 megohms (versus 1,000 ohms for junction transistors). Its unique combination of properties has enabled it to perform some novel circuit functions not possible with other transistors.

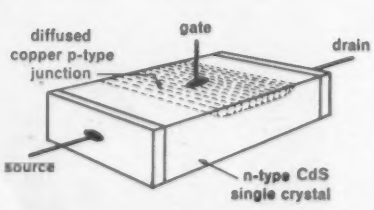
Still in the early experimental stage, this phototransistor is a tangible result of the General Motors Research Laboratories' program on semiconductors — particularly the group II-VI compound, cadmium sulfide. Behind its development lies the steady accumulation of (1) know-how in crystal growing, doping, and contact preparation and (2) information about CdS's intriguing solid state properties (red or green luminescence, high photoconductivity, short relaxation times, etc.).

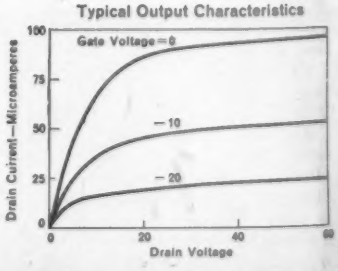
For the researcher, this three-terminal device is adding a new dimension to the fundamental understanding of semiconductors. For instance: GM Research scientists have uncovered the important role of photo-generated holes in modulating the conductance of this intrinsic semiconductor and have determined the hole drift mobility through a new theoretical analysis.

These semiconductor investigations illustrate the dual aim of GM Research: contributions to the science, advances in the technology of important new subject areas. Such research is the initial step in General Motors' continuing quest for "more and better things for more people."

General Motors Research Laboratories

Warren, Michigan





SATELLITES

Courier I-B Launched

New communications satellite, with 20 teletypewriter channels, broadcasts news stories from New Jersey to Puerto Rico. The new moon is nearly jam-proof.

▶ THE THIRD ANNIVERSARY of Russia's launching on Oct. 4, 1957, of the world's first satellite brought no major space effort from Russia. Instead, the U. S. triumphed with an active repeater Courier I-B satellite, a forerunner of world-wide communications by satellites.

The 500-pound sphere, covered with solar cells for power, was launched from Cape Canaveral by a 79-foot Thor-Able-Star rocket. Thus, the U. S.-USSR space score just three years after Sputnik became: 26 successful satellites and two deep space probes by the U. S. vs. six earth satellites, one deep space probe and one impact on the moon by the USSR.

The satellite's first orbit brought a message from President Eisenhower to Secretary of State Christian A. Herter at the United Nations in New York.

As Courier speeds about the earth at 20,000 miles an hour, U. S. Army ground stations at Fort Monmouth, N. J., and Salinas, Puerto Rico, feed messages to it and receive them from it. Courier responds only to coded signals from these ground units. Thus, it is just about jam-proof.

Courier has a small transmitter that continuously radiates a signal to alert the ground stations of its approach. Then the ground station tells Courier to unload its recorded (via magnetic tape) messages.

Radio hams cannot receive Courier's secret microwave signals but may catch its tracking signals at 107.97 megacycles.

Through 20 teletype channels, Courier can sweep over a station and in five minutes receive more than 340,000 words —half the length of the Bible—and at the same time broadcast the same amount. Courier also has the capacity to receive and broadcast speech.

In a demonstration, Courier speeded regular news copy between the ground stations.

Of America's two communications satellites, the new Courier rather than Echo seems more practical to most scientific observers. They say future operational communications systems will almost certainly be patterned after this newer satellite.

The reasons:

1. The balloon-like Echo is so light that even the tiny pressure of sunlight—one-fiftieth of an ounce on Echo's surface—lowers the satellite's orbit 3.5 miles a day. The pressure also changes the shape of the orbit. Thus, Echo-type satellites are short-lived by nature.

2. Ground stations powerful enough to bounce signals off Echo are much more expensive than systems which must have only enough power to reach an active repeater like Courier, which has its own broadcasting system and power source.

3. The big drawbacks of Courier—the short life of its tubes and its need for large amounts of power—are being rapidly attacked and overcome. Tubes with lives of ten years and possibly more are now under development at Bell Telephone Laboratories.

The problem of power is really one of weight. The power sources of satellites are their biggest weight. Dr. John R. Pierce, who proposed communications satellites before Sputnik and is director of research-communications principles at Bell, feels that operational communications satellites must have low-power transmitters.

"We should note that such a low power is made possible only by using a broadband modulation method, such as wide deviation FM and an FM feedback receiver."

Dr. Pierce has reported that Bell is working on such low-power systems. He now believes that "active satellites appear superior to passive satellites for commercial communications."

After Courier repeater experiments, the Defense Department plans to orbit Advent communications satellites of more advanced capability. The Advent system would employ three 24-hour active satellites.

They would cruise in an equatorial orbit 22,500 miles high at the same rate as the earth rotates. Thus they would seem to stand still.

The three Advents together would be in direct line-of-sight with every point on the globe except small areas of the Arctic and Antarctic. And each satellite would at all times be in line-of-sight with the other two.

Thus micro-wave messages could be relayed almost instantaneously.

• Science News Letter, 78:243 October 15, 1960

ASTRONAUTICS

Sun Pressure on Echo

▶ THE PRESSURE of sunlight pushes the balloon satellite Echo 3.5 miles closer to the earth each day, National Aeronautics and Space Administration scientists have figured from orbital data. They say this means Echo may continue in orbit for a year before dropping into dense enough atmosphere to cause the satellite to burn from air friction.

Without the sun's pressure, the satellite might live 20 years, the scientists say.

Dr. Robert Jastrow and Robert Bryant of NASA's Goddard Space Flight Center say the lowest point in Echo's orbit on Aug. 12, when the satellite went into orbit, was 932 miles. The orbit was nearly circular.

The sunlight has pushed the orbit out of shape and pushed Echo until on Sept. 11 it dropped to 864 miles altitude.

The scientists figure the sun's total force on the 100-foot-diameter Echo is only one-fiftieth of an ounce. But Echo is so light that this pressure creates a considerable downward movement.

Some scientists believe light spacecraft with big sails could move about like sailboats, using the sun's pressure as "wind."

Dr. Jastrow and Mr. Bryant also have found that even the very thin air has a big effect.

The drag holds back the forward rush of the satellite so that gravity's pull lowers it into a smaller orbit. Thus the "slowed" satellite actually gets around the earth quicker because it is traveling a shorter route.

Each week, Echo has taken one second less to go around the earth.

Radio signals are still being bounced off Echo in communications experiments. And Echo is still a sphere. It has only a few wrinkles to show for its many miles.

But scientists believe its gases have leaked out. There just is not enough outside pressure that high up to make Echo collapse.

Because its path is often south of the equator at night and because at other times it is often in the earth's shadow, Echo is not often visible in the United States. But NASA expects it to be visible more often the latter half of October.

• Science News Letter, 78:243 October 15, 1960

3-D PLOTTER—A three-dimensional plotting device has been developed by Chrysler Corporation Missile Division engineers to record paths of rockets, satellites and aircraft.

GENERAL SCIENCE

Russia Far Behind U.S.

➤ SOVIET SCIENCE is far behind that of the United States, despite Russian achievements in space.

This is the opinion of the Princeton professor of chemistry, Dr. John Turkevich, who was recently science attache at the American Embassy in Moscow.

In an oral report to the National Science Foundation he said that both Russian politicians and scientists recognize U. S. scientific superiority. The United States has "the most powerful and aggressive group of scientists and science programs, and the best-equipped laboratories in the world."

Despite their Sputniks, Dr. Turkevich was notably unimpressed with Soviet science generally and charged that neither their equipment in science nor talent matched ours. "For every good man they have, we have ten," the Princeton chemist said.

Even Soviet Premier Khrushchev acknowledges this superiority, he said. Last year, in a conversation with the Soviet leader on U. S. ability in space, Dr. Turkevich asserted that eventually the U. S. would beat the Soviets in their launch ability. Khrushchev responded: "America is powerful and strong. If Americans put their mind to beating us, they can do it."

Faith in Science

Officially, however, the Communists insist that Sputnik has proved that science can advance faster under a communist system. Dr. Turkevich said his experiences in Russia convinced him that the Soviet people had more faith in science and technology as a way of life than Marxism. A tremendous concentration upward on outer space, rather than communism, better explains Soviet advances in this area, Dr. Turkevich said.

Actually, their system as applied to science and technology "is so inefficient that they cannot put anything on the road" despite their impressive launches, he said. "There is not nearly as much basic research being done in Russia as in the United States," the science diplomat said. "They have had notable failures about which they are quiet."

Prominent among these is "their 30,000-ton white elephant," the 10 BEV (billion electronic volt) atomic accelerator, virtually ineffective because of faulty construction that may be attributed to undue haste in an attempt to outdo the U. S. in accelerator development.

"Sometimes, especially in science, it pays to go slowly," said Dr. Turkevich, pointing to the success of the accelerators at Brookhaven National Laboratory and the Stanford accelerator, both in full and successful operation.

He credited the national concentration in the Soviet Union on science to the large numbers of engineers and scientists prominent in their government.

Soviet and American space achievements have been compared to an alarm clock and a small Swiss watch. Dr. Turkevich said the comparison is apt, except that it should be added that "It was the Soviet alarm clock that woke America up to make the Swiss watch."

He decried the tendency of Americans to sell their science achievements short. But he also warned against complacency. The present weakness in Soviet science only "gives us breathing space."

• Science News Letter, 78:244 October 15, 1960

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PHYSICS

Maser Transmits 25 Miles

➤ LIGHT PULSES generated by a new device have opened a new method of communication, particularly for sending messages in space.

Light from an optical maser has been received 25 miles away, and also transmitted one-quarter of a mile through a two-inch circular wave guide, scientists from Bell Telephone Laboratories said.

The optical maser produces a very sharply defined light beam using atomic methods. Maser is an acronym for Microwave Amplification by Stimulated Emission of Radiation. (See SNL, 78: 53, 1960.)

Because the light generated by the ruby maser is a very narrow beam, it can be transmitted in the desired direction with little loss, even without use of a lens. The light from a ruby rod one-quarter of an inch in diameter had spread to only 200 feet when it was received 25 miles away in Murray Hill, N. J.

Using the same maser and a lens only four inches in diameter Bell scientists believe they could beam light to the moon.

The optical maser system of communication is expected to be especially useful for space communications, because there are few dust particles and no moisture to scatter the light as they do in the earth's atmosphere.

The Bell experiments with the optical maser are in preliminary stages and are continuing. One possible application for the intense monochromatic light is to speed up chemical reactions.

The light pulses sent over the 25-mile distance lasted about half a thousandth of a second each. During each pulse there were several hundred peaks, indicating that information could be carried by the light beam.

The method was suggested early in 1959 by Dr. C. H. Townes, now a consultant for the Institute for Defense Analyses, Washington, and Dr. A. L. Schawlow of Bell Telephone Laboratories, who received a patent on it this year. Drs. R. J. Collins, D. F. Nelson, W. L. Bond, C. G. B. Garrett, W. K. Kaiser and W. S. Boyle of Bell helped to develop the ruby optical maser.

• Science News Letter, 78:245 October 15, 1960

PSYCHIATRY

Police Play Themselves In Film on Mentally Ill

➤ POLICE OFFICERS act themselves in an unusual film on handling the mentally ill.

The training film, shown for the first time at the meeting of the International Association of Chiefs of Police in Washington, D. C., stars members of the New Orleans, La., police force. It underscores the fact that most police stations and police are ill-equipped both in facilities and materials for handling emotionally disturbed people.

It was produced by the Louisiana Association for Mental Health under the National Institute of Mental Health, community services branch, to accompany a widely used police manual "How to Recognize and Handle Abnormal People."

Time and patience are essential in handling most disturbed people. And while psychiatrists stress the fact that most mentally ill people are not violent, they also recognize the fact that those with whom police come in contact in the course of their duties often are.

• Science News Letter, 78:245 October 15, 1960

ROENTGENOLOGY

"Hidden" Spleen Seen By New Method

➤ THE SPLEEN now can be "seen" and studied by a new method developed at the University of North Carolina School of Medicine and reported to the American Roentgen Ray Society meeting in Atlantic City, N. J.

Commonly called a "hidden" organ, the spleen cannot be felt unless enlarged and, until now, could not be studied adequately by other known methods, including diagnostic X-ray. The large, glandlike ductless organ in the upper left side of the abdomen performs important functions, including setting free the hemoglobin in blood that carries oxygen from the lungs to the tissues of the body.

Dr. Philip M. Johnson, until recently at the University of North Carolina School of Medicine, Dr. Ernest H. Wood, professor of radiology, and Dr. Stewart L. Mooring, assistant in radiology, found they could cause a radioactive substance, chromium-51, to concentrate rapidly in the spleen, permitting them a "scan" of the spleen both in normal persons and patients with diseased spleens. A scan is a picture of a body part made with electronic equipment sensitive to radioactivity. The researchers have used their method successfully and safely on more than 30 patients.

Their research was supported by a grant from the U. S. Public Health Service.

• Science News Letter, 78:245 October 15, 1960

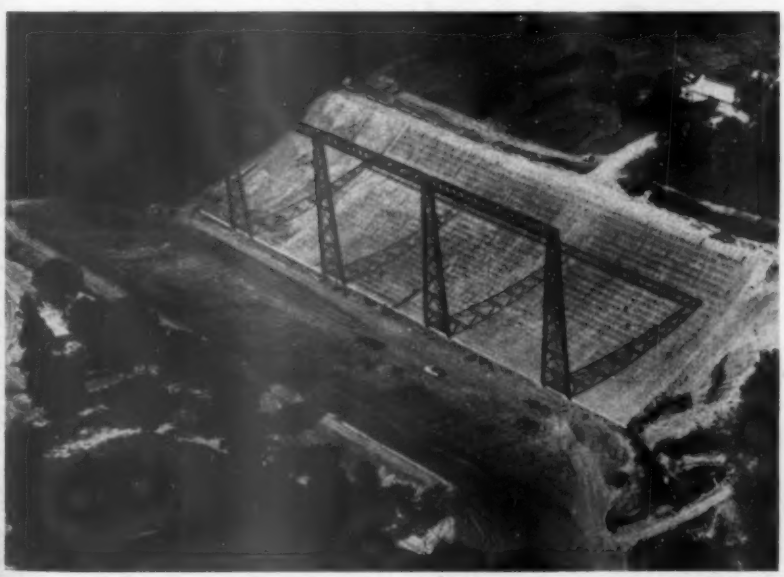
PHYSICS

Austria Gets Reactor For Research Center

➤ FOR THE FIRST TIME atomic scientists will be able to view their experiments directly during irradiation in the center of a reactor. This advantage is one of the unique features of Europe's most advanced nuclear reactor, built by American Machine & Foundry Company, now operating in Austria.

The reactor, Austria's first, is the heart of a new $6,000,000 nuclear research center at Seibersdorf on the outskirts of Vienna, headquarters city of the International Atomic Energy Agency. More than 200 scientists will staff the 16-building center, conducting basic and applied research in physics, chemistry, metallurgy, biology, medicine, agriculture, isotope production, solid state studies and materials testing for industry.

• Science News Letter, 78:245 October 15, 1960



RADIO TELESCOPE—A "radio ear" as big as five football fields put together is taking shape along the Vermilion River southeast of Danville, Ill., where the University of Illinois is building a radio telescope. The project is being financed by the Office of Naval Research.

TECHNOLOGY

New Computer Fastest

➤ THE FASTEST and most advanced computer system in operation anywhere, the UNIVAC LARC, is now working at the University of California's Lawrence Radiation Laboratory in Livermore, Calif.

The huge solid-state digital computer will be used in a variety of Atomic Energy Commission-supported research projects to solve problems of almost unbelievable complexity, problems that were unapproachable with existing computer systems.

Acquisition of the LARC will provide scientists with a valuable new tool in their attack upon problems in nuclear science and technology which are of vital importance to the nation's defense, Dr. Harold Brown, director, explained.

Many times faster than existing computer systems, the LARC was designed and built by Remington Rand UNIVAC with funds from the AEC. The Livermore laboratory is operated by the University of California for the AEC.

Almost all of the LARC's efforts will be devoted to nuclear weapons projects and fundamental studies of problems in nuclear physics of direct or potential application to the nation's weapons program.

Some of the areas to be studied with the LARC include the behavior of neutrons in nuclear explosives and reactors, the fundamental structure of the atomic nucleus, and the development of an accurate system of weather prediction.

In the latter project, the new computer will treat the earth's atmosphere as five separate layers while digesting data from weather stations throughout the country. From its computations the LARC will draw a weather map for each atmospheric layer. Such weather maps are expected to provide a degree of accuracy in weather prediction never before realized.

The LARC is capable of performing 250,000 additions or 125,000 multiplications per second. At this rate, it would take 40 men working with desk calculators for 100 years to equal the number of computations that the LARC can perform in one hour.

The system actually consists of two interconnected computers, one of which takes instructions from the other. The LARC contains some 80,000 transistors and 600 vacuum tubes in the computers and input-output devices. Its high-speed magnetic core memory will store up to 97,500 words (or 11-digit numbers), while an additional six million words may be stored on high-speed drums.

The computer is capable of acting upon 76 different types of instructions. Its mechanical printer will print 720 lines of results per minute. But for much faster operation, the LARC is equipped to display results on the face of a cathode ray tube. These results are automatically photographed for later development. The photographic process will record up to 9,600 lines of output per minute, and can also be used to draw graphs of results, plotting an average of 120,000 points per minute.

• Science News Letter, 78:246 October 15, 1960

VETERINARY MEDICINE

Window in Cow's Stomach

➤ A COW WITH A "WINDOW" in her stomach is giving an inside view of tranquilizing effects.

At the Second Demonstration Conference on Diseases of Farm Animals in Pennsylvania, Kennett Square, Pa., the window, prepared by minor surgery under anesthesia, was designed to give students and researchers a direct view of what drugs do to part of the digestive tract.

Noting that animals and humans alike have shared in the benefits of discoveries such as antibiotics, insecticides and tranquilizers, Dr. John E. Martin of the University of Pennsylvania School of Veterinary Medicine demonstrated how the cow's stomach quieted down after she took the antimotility drug isopropamide.

Also demonstrated at the conference were traps and baits for catching wild animals that may play a part in transmitting leptospirosis from farm to farm. This disease costs farmers about $200,000,000 yearly in animal loss.

It strikes many cattle, swine and horses and has varied clinical symptoms, including abortion, fever, drop in milk production, kidney and eye ailments. Leptospirosis can also be transmitted to household pets and to man. The research program at the New Bolton Center at Kennett Square includes a special laboratory, sponsored by the U. S. Department of Agriculture.

Mastitis research is being done on 30 young cows that will have their first calves and begin their milking life at the Center. A popular theory is that mastitis, a disease of the cow's mammary gland, is spread by poorly managed use of the milking machine. Dr. James M. Murphy of the School of Veterinary Medicine will try to find out how some cows resist infection.

• Science News Letter, 78:246 October 15, 1960

MEDICINE

Skin From Lost Limbs Preserved for Graft

➤ SKIN FROM LIMBS LOST in mining accidents has been successfully preserved by using fixed cold temperature procedures, Dr. Werner Budrass, senior physician at the Miners' Hospital in Bochum, Germany, reported to the first International Congress on Research in Burns at Bethesda, Md. He said the skin was later grafted to patients who retained it for as long as three months. The patients' own skin can heal while protected by the skin grafts.

Storage is safe for at least five years before use.

Dr. Budrass reported work with an investigation commission of the Mining Union, a government institution operating in France, Belgium, Luxembourg, the Netherlands, Italy and Germany. In an interview he said that his temperature procedure differs from any in the U. S.

"Because of the number of amputations necessary in coal mine accidents," he said, "we are able to obtain sufficient human skin for our needs." The skin is frozen relatively slowly at temperatures of minus 40 degrees centigrade, and after two days the temperature is kept at from minus one to minus three degrees so that protein decay does not take place.

Freeze drying, or lyophilization, can preserve the skin until needed. Storage containers are flushed with nitrogen several times before they are closed in vacuum to drive out as much as possible of the remaining oxygen.

Glass vessels are packed in padded tin cans for protection against the action of light, and the cans are stored at minus 18 degrees centigrade. This gives added protection during storage by reducing the posthumous changes of skin-protein and oxidation of fats, both of which depend largely on light and room temperature.

It is the temperature procedure, he believes, that makes both preservation of skin and homografts—grafting the skin of one person onto another person—so successful in European coal mining areas.

• Science News Letter, 78:246 October 15, 1960

MEDICINE

Prenatal X-ray Can Save Blood Problem Babies

➤ PREGNANT WOMEN whose blood is Rh negative were advised to have X-ray examinations during the last two months before confinement by Dr. Paul A. Bishop of Philadelphia, who spoke to the American Roentgen Ray Society meeting in Atlantic City.

The child born of an Rh negative mother and an Rh positive father may have fetal hydrops, a blood condition in severest form. It occurs once in 2,000 deliveries, and without replacment of blood by transfusion can be fatal.

The condition is no longer a hopeless one, Dr. Bishop said. Modern methods in the care of premature infants and the spectacular results of replacement transfusion techniques make early diagnosis of fetal hydrops of great practical importance. He illustrated with a case not suspected until X-ray diagnosis stimulated prompt action.

"Caesarian section followed by immediate and repeated replacement transfusions resulted in a vigorous baby that continues to thrive," Dr. Bishop said.

X-ray studies are advisable whenever there is a suspicion of an abnormal amount of fluid in the sac that holds the baby in the mother's uterus.

• Science News Letter, 78:246 October 15, 1960

MEDICINE

Thyroid Affects Cancers

➤ FEMALE RATS that have had their thyroids removed get mammary, or breast, cancer less easily than normal rats. Cancer occurrence also is decreased in rats given large amounts of L-thyroxine, an active thyroid hormone, commonly given to people with hypothyroidism.

The Chicago scientists who report this in Nature, 188:73, 1960, do not suggest that this necessarily can be applied to human cancer, but it is a lead that undoubtedly will be followed in further research.

One of the scientists of the Ben May Laboratory for Cancer Research, University of Chicago, is Dr. Charles Huggins, the director, whose researches in the past have resulted in the successful treatment of human cancer of the prostate gland with estrogens, female hormones. This is one of the outstanding successful cancer treatments. His colleague in the present researches is Dr. John W. Jull.

Four groups of rats were given 3-methylcholanthrene (MC), a cancer-causing chemical. But first, certain groups underwent operations for removal of the thyroid and others for removal of ovaries. At the age of 63 days all the animals were fed MC semi-weekly for seven weeks. At the same time MC was fed to a group of normal rats used as controls, and to two groups that received L-thyroxine in respective doses of 0.5 milligram and 1 milligram.

All normal control female rats, and those receiving the L-thyroxine in the smaller dosage, developed multiple mammary cancer. Frequently the tumors grew to a weight of 15 grams by the 90th day of the experiment.

Rats that had had their ovaries or thyroids removed had a significant decrease in the incidence of mammary cancer and a delay in the development. Only solitary cancers developed, and these remained small during a six-month observation. The weight of the largest tumor was less than 100 milligrams.

The scientists say that the decrease in incidence of mammary cancer in the rats whose ovaries had been removed is certainly due to the deficiency of ovarian hormones.

The rats whose thyroids had been removed showed a decrease in the occurrence of breast cancer because of the influence of smaller caloric intake, which has been shown to have a marked effect on the beginning of tumors.

No reason is given for the decrease in mammary cancer among the rats that got large amounts of L-thyroxine.

• Science News Letter, 78:247 October 15, 1960

PSYCHOLOGY

Creative Ability Related to Humor

➤ YOUR CHILD'S C.Q. (creativity quotient) is related to his sense of humor. Research by Prof. Jacob W. Getzels and Prof. Philip W. Jackson of the University of Chicago points to development of a "creativity quotient" similar to the I.Q. system of ratings now in use.

For their research on giftedness, they used a group of about 500 adolescents in the University of Chicago Laboratory School from the sixth grade to the end of the senior year in high school. They found that the emphasis on sense of humor is so marked that it is the one characteristic that sharply sets apart the high-creativity group from all other groups.

Their research also disclosed that teachers prefer the high I.Q. child to the child with the high C.Q. The highly creative child studied was selected only if he was not in the top 20% in I.Q. The high I.Q. child and the high C.Q. child were equally superior in school achievement to the student population as a whole.

• Science News Letter, 78:247 October 15, 1960

PHYSIOLOGY

Human Nerve Impulses Feed Electronic Computer

➤ An ELECTRONIC COMPUTER is being used to compare the behavior of man and the electrical impulses that are a measure of his nerve responses. An International Business Machines Corporation 704 computer is also recording nerve responses of crayfish in the hope of applying some of the technique to man's muscle activity.

Dr. William R. Uttal of IBM's Research Laboratory in Yorktown Heights, N. Y., reported on coding mechanisms to the Second IBM Medical Symposium in Endicott, N. Y.

Dr. Uttal told SCIENCE SERVICE that "we are collecting the nerve responses and comparing them with the magnitude estimates reported by the person verbally. Some things correlate and others do not. We are searching for key code variables."

The reason for studying crayfish, he said, is that it is a convenient and interesting animal, and the pooled nerve responses are similar to the electrophysiological activity recorded from man.

Computers are being used in various types of research involving enormous quantities of data. In a few seconds of experimental time millions of "bits" of information can be recorded.

• Science News Letter, 78:247 October 15, 1960

MINERALOGY

Super-Graphite Makes Better Rocket Nozzles

➤ TOUGHER AND MORE DURABLE rocket motor nozzles are now possible with a new super-graphite produced by the National Carbon Company in New York. This high-density material is made by a hot-working process that gives a recrystallized graphite with about two to three times the high-temperature strength of conventional graphites.

The crystal alignment and internal structure of the super-graphite provide high strength at temperatures up to 5,500 degrees Fahrenheit. The material has good machinability, thermal shock resistance and a low creep rate.

Performance tests of rocket motor nozzle inserts made of the recrystallized graphite show that it is as good as, and in some cases better than, such materials as tungsten and pyrolytic graphite. There are no limits to the size of the objects that can be produced from this material.

The recrystallizing process, on which National Carbon began work in 1953, produces a more uniform and compact structure. Careful control of this process produces different graphites with properties suited for a large number of applications.

• Science News Letter, 78:247 October 15, 1960

FASTEST HYDROFOIL—The U.S. Navy is demonstrating the most advanced hydrofoil vessel in existence, developed for the Office of Naval Research by Dynamic Developments, Inc., of Babylon, N.Y. It was shown at The Hague at an international symposium on hydrodynamics recently.

BOTANY

Plant Growth Substances Confuse Sex in Flowers

➤ PLANT GROWTH SUBSTANCES have confused the green world so thoroughly that some plants are producing flowers of the opposite sex.

Dr. E. W. Weston of the University of London reports in Nature, 188:81, 1960, that female hop plants have produced male flowers after being sprayed, during early stages of growth, with low doses of a weakly active plant growth substance, alpha (2-chlorophenylthio) propionic acid.

Other researchers, Dr. Weston notes, have reported female flowers on male plants after spraying with other growth substances, 2:4-dichlorophenoxyacetic acid and indoleacetic acid.

The difference in which way the sex change goes depends upon whether the plant to be sprayed is a short-day plant, like poinsettias and chrysanthemums, or a long-day plant, such as hop plants and spinach.

Short-day plants are those that begin to flower when the days begin to shorten and the nights become longer. Long-day plants behave just the opposite.

High auxin (plant growth substance) levels in short-day plants might promote pistillate or female structures, Dr. Weston asserts, while high auxin levels in long-day plants enhance staminate or male structure formation.

• Science News Letter, 78:248 October 15, 1960

MEDICINE

"Sick" Parties Can Cure Desire for Alcohol

➤ ALCOHOLICS known as the "bucket brigade" are getting together for daily drinking parties that end when everyone is thoroughly sick. The parties last less than an hour and the main cocktail is plain water.

Drs. Ernest C. Miller and B. Anthony Dvorak and third-year medical student Don W. Turner, all of the Tulane University School of Medicine, New Orleans, La., explain that the experimental parties are designed to teach the alcoholics that any alcoholic beverage will make them vomit. Drugs that enhance emesis (vomiting) when alcohol is consumed are used to help the patients along.

When the party begins, each patient enters the room with a bucket and a towel. He is given a water glass and a jigger glass. On a spotlighted table is an array of vodka, Scotch, bourbon, gin, rye, rum, wines, 95% ethyl alcohol, a liqueur and beer.

After drinking two glasses of water, each patient gets an injection of a drug mixture containing emetine and is then asked to pour a drink for himself. At frequent intervals each man sniffs at his glass, and only when gagging begins, or when it seems likely that the individual is about to vomit, is he asked to drink the liquor. Between bouts of emesis the patients are encouraged to drink large amounts of water, and as many different beverages as possible are included in the pour-sniff-drink routine.

The group is not released until "all doubt is dispelled from the mind of each participant that he cannot tolerate any of the alcoholic beverages on the table." This usually takes 30 to 45 minutes a day for two weeks.

The power of suggestion—that the smell, taste or even the sight of alcohol produces nausea and vomiting—is very strong among members of the group. In many cases, the researchers report in the Quarterly Journal of Studies on Alcohol, 21:424, 1960, it is advantageous to include a "ringer" or previously conditioned member in the group.

The project has been in operation eight months, and to date, five of the 20 patients treated have remained abstinent, three have had brief lapses of from one to three days of drinking and two patients have returned to their old habits. The other ten have not been followed up.

• Science News Letter, 78:248 October 15, 1960

ENTOMOLOGY

Pestiferous Face Fly Across Mississippi River

➤ FACE FLIES, the enemy agents that invaded New York from Nova Scotia in 1953, have succeeded in pushing their psychological warfare campaign across the Mississippi River into the central states.

Although not known to be carriers of a fatal disease, these pests can worry a horse or cow to a frazzle by lapping up fluids around the eyes and nose and around open wounds. There are reports that horses are particularly hard to handle after irritating attacks from face flies, and that cows refuse to feed properly and their milk production drops.

The face fly stayed in the New York state area until 1957-1958. Now, in three years, it has spread to every state east of the Mississippi River as far south as Tennessee and West Virginia, and it is making a beeline for the West Coast. Minnesota, Iowa, Missouri and Nebraska have reported the pest. But western Pennsylvania is the hardest-hit area at present.

Entomologist W. G. Bruce of the U. S. Department of Agriculture admits that not too much is known about the fly. There is no known effective control, but a mixture of syrup, water and DDVP is doing some good. DDVP is dichloro-diphenyl-vinyl-phosphate.

This fly does not attack in the shade, inside barns and other buildings. It usually stays out in the bright sunlight except in the fall when the temperature drops.

Some Canadian investigators believe the pest is associated with outbreaks of pink eye (infectious keratitis), but this has not been proved.

One reason the face fly has such a head start is that it looks much like the common house fly. Farmers ignore it at first. There are differences, however, in the head anatomy and in the veins of the wings. There is also a difference in the mouth parts, since the face fly does not bite, but rather laps up fluids.

• Science News Letter, 78:248 October 15, 1960

IN SCIEN

METALLURGY

Cuban Nickel Inferior To That of Other Places

➤ IN CLOSING its $110,000,000 nickel plant at Nicaro, Cuba, the United States is closing off a major source of nickel—but an inferior one. The U. S. has announced it is ending production at Nicaro because of "confiscatory taxes and harassment" by the Cuban Government.

In recent years the U. S. has imported more than 20,000 tons of oxide powder and sinter (cinder-like material) from Nicaro. In the same years, imports from all countries totaled about 30,000 tons of oxide powder and sinter plus between 60,000 and 100,000 tons of pure nickel.

The powder and sinter came from Cuba and Canada. The pure metal came from five European countries and Japan. The nickel powder and sinter produced by the Nicaro plant had more impurities than has the Canadian.

When there was a big demand for nickel, buyers accepted the Cuban nickel gladly, but during 1958 an oversupply of nickel developed. Buyers began to look for higher grade material. A research program was directed toward improving and diversifying the Nicaro products, but increased activity of the Cuban revolution in the Nicaro area in the last part of 1958 ended the research.

The major use of nickel, exclusive of scrap nickel, in the U. S. has been for stainless steels.

• Science News Letter, 78:248 October 15, 1960

MEDICINE

Blood Preserved for Use Up to Thirty Days

➤ THE PROBLEM of preserving whole blood for use when needed was considerably eased with the announcement that a recently developed preservative can keep enough red blood cells alive to permit safe blood transfusions with blood 30 days old.

Dr. John G. Gibson II, associate in medicine at Peter Bent Brigham Hospital, Harvard Medical School, said clinical tests showed the preparation can be safely stored in routine hospital blood bank practice up to 30 days after collection. The preservative, Citrate-Phosphate-Dextrose, was developed at Harvard Medical School in 1956.

Dr. Gibson said the School's laboratories have now used the preservative to store blood from 27 to 32 days with an average red blood cell survival of 75%. The accepted safe minimum survival of red blood cells for transfusion is 70%.

Earlier this year Peter Bent Brigham Hospital used CPD-preserved blood in open heart surgery. No harmful reactions were recorded. Dr. Gibson tagged the cells with chromium.

• Science News Letter, 78:248 October 15, 1960

NE FIELDS

MEDICINE

Superior New Antibiotic Attacks Staph Infection

▶ A NEWLY DISCOVERED antibiotic, demethylchlortetracycline (DMCT), shown to be nearly twice as effective against staphyloccal infection as the older antibiotic tetracycline (TC), is reported in a study of its merits in the British Medical Journal, Oct. 1, 1960.

The report on this antibiotic, by a Boston and London medical team, states the new antibiotic may be "entirely new or prove to be related in structure and action to another already known." Research has been in progress since DMCT was first reported three years ago by Dr. J. R. D. McCormick and his associates at the Lederle Labortaries, Pearl River, N. Y.

Drs. Maxwell Finland of Harvard Medical School and L. P. Garrod of the University of London, aided in part by a National Institutes of Health grant, report observations after studying voluminous works of researchers, published and unpublished.

Although the final merits of this new antibiotic have not been decided, the investigators point out the following advantages:

1. DMCT has high stability.

2. Its activity against most bacteria exceeds that of TC by approximately twofold. (Only two daily doses are required, which is an important advantage for patients requiring sleep.)

3. Urine elimination is less than half that of TC, allowing healing concentrations of DMCT to remain in the blood for a much longer time after a dose.

DMCT is available by doctor's prescription. Lederle Laboratories supplied its products "declomycin" and "ledermycin" for the studies. Lederle is the only pharmaceutical company licensed to produce DMCT.

• Science News Letter, 78:249 October 15, 1960

BACTERIOLOGY

Fluorescent Enzymes Help Bacteria Make Food

▶ TWO SUBSTANCES that show up as eerie, blue fluorescent lights inside living bacteria are involved in helping these tiny plants change carbon dioxide to food. The discovery brings researchers one step closer to solving the mystery of photosynthesis.

Dr. John M. Olson of Brandeis University, Waltham, Mass., reported at the Symposium on Recent Developments in Research Methods and Instrumentation in Washington, D. C., that in purple bacteria the two chemicals that help "drive photosynthesis" are pyridine nucleotides known as DPN and TPN. DPN is diphosphopyridine nucleotide and TPN is triphosphopyridine nucleotide.

The purple bacteria contain chlorophyll that is active in the presence of far-red light of 8,000 to 9,000 angstroms wavelengths, invisible to the human eye. When the bacteria are receiving none of this red light, the DPN and TPN show a blue fluorescence of relatively weak intensity. When the red light is beamed at the bacteria, the intensity of the blue fluorescence increases. Gradually, after a red light is switched off, the brightness of the blue dims again.

The changes in intensity, Dr. Olson believes, indicate that the carbon dioxide is being "fixed" or reduced to food by the chemicals, which are enzymes.

• Science News Letter, 78:249 October 15, 1960

AERONAUTICS

Experimental Radar Shows Aircraft Height

▶ AN EXPERIMENTAL RADAR has been set up at the Federal Aviation Agency's National Aviation Facilities Experimental Center in Atlantic City, N. J., to show how high planes are flying near the Center's landing field.

Conventional radar equipment at airports tells traffic controllers the direction and distance of aircraft, but not the height. FAA officials believe the height-surveying radar may help eliminate crashes in the heavy air traffic near airports.

• Science News Letter, 78:249 October 15, 1960

ASTRONOMY

Many Stars "Near" Sun Remain Undiscovered

▶ THERE are probably many stars "near" the sun still to be discovered, Dr. Olin J. Eggen of the Royal Greenwich Observatory, Herstmonceux Castle, Sussex, predicts.

The undiscovered stars belong to two stellar groups known as Hyades and Sirius. The Hyades group is about 130 light years from the sun, and contains about 350 stars, some 200 more than previously believed. A light year is the distance light, traveling at 186,000 miles a second, covers in a year, or about six million million miles. The closest star to the sun is Alphi Centauri, four and a third light years away.

Just as the rails of a track seem to converge in the distance, so the parallel paths of stars in a stellar group are directed toward a point if the cluster is moving away from the sun. This perspective effect is particularly noticeable in the motions of stars of the Hyades cluster.

By analyzing the known motions of all stars, Dr. Eggen found 200 new members of the Hyades group. "There are probably many undiscovered members" of this group and of the Sirius group, near the sun, Dr. Eggen reports in Monthly Notices of the Royal Astronomical Society, Vol. 120:563, 1960.

Dr. Eggen found that stars of the Sirius group are younger than those of the Hyades group. Members of the Sirius group in the past were assigned to the Ursa Major stream, which contains the bright stars of the Big Dipper.

• Science News Letter, 78:249 October 15, 1960

MEDICINE

"Instant Energy" From Blood's Thyroid Hormone

▶ WHEN YOU EXERCISE strenuously, your body may tap circulating blood reserves of thyroid hormone necessary to produce energy without the need of stepping up thyroid gland production.

This is the belief of Drs. J. Thomas Dowling and J. T. Nicoloff of the University of California Medical School, Los Angeles, and Los Angeles Veterans Administration Center, who have been studying transport of the hormone in the blood. The hormone, thyroxine, is transported through the blood stream in a sort of "towing" operation by special proteins to which it is bound.

Although the thyroid hormone is involved in many bodily processes, thyroid gland production schedule is relatively constant, they point out. Since the gland never seems to step up production appreciably, scientists have been puzzled as to how sudden demands for the hormone are met.

Human volunteers were asked by the doctors to run various distances. Samples of their blood were taken immediately after the exercise and again after they had rested. After they had run as little as 100 yards the binding of thyroxine to proteins was found to be considerably reduced.

This suggested that a small portion of circulating thyroxine was suddenly "cut loose" from its "towing" proteins in order to meet sudden energy demands. Changes in the character of the blood, perhaps acids produced in the exercise process, are responsible for the "cutting loose" of the hormone. An hour after completion of the exercise, binding and "towing" processes returned to normal.

Thus the body may meet temporary needs for thyroxine without sudden strains on the thyroid gland.

• Science News Letter, 78:249 October 15, 1960

METEOROLOGY

Sealed Orders Help Explore Rain Secrets

▶ SECRET ORDERS, in sealed envelopes, on cloud-seeding were issued to a University of Chicago weather research team, trying to unlock the secrets of the raindrop this summer.

The ten-man team, headed by Roscoe R. Braham Jr., associate professor of meteorology at the University, used this secrecy as part of a special process to "randomize" the order in which days are selected for seeding clouds with silver iodide.

The weather team was on location in the Missouri Ozarks for its weather spying under a National Science Foundation grant. The object of its research is to identify and isolate physical processes associated with production of rain in summer cumulus clouds and to study the rain-producing effects of the cloud-seeding with silver iodide.

• Science News Letter, 78:249 October 15, 1960

MEDICINE

Starting a Stopped Heart

Physicians now have a portable electronic device, the pacemaker, to restart a heart that has stopped. Patients can learn to use the device themselves, Faye Marley reports.

➤ TO RESTART A HEART that has stopped, the physician now has a less-than-a-pound electronic device that he can carry in his little black bag and use in a cardiac emergency.

Dozens of times a day this new artificial heart pacemaker will in the coming months be used to save a life by starting a normal rhythm.

It might be applicable to the kind of heart condition that President Eisenhower has so successfully overcome in the five year since his heart attack.

This is perhaps the most important potential service of this new medical device, but it is joining the oxygen cylinder, the injection of adrenalin and the heroic heart massage in medical treatment of cardiac emergencies anywhere.

It is known that medical aid is constantly near President Eisenhower, in the hands of his attending physicians. They have a pacemaker in their equipment along with oxygen and other treatment and preventive apparatus.

When the pacemaker was invented several years ago, the only size available—one that is still used because of attachments such as the defibrillator to stop heart flutter—weighed 13 pounds. It costs $375.

Another type of "heart pacer" weighs nine and three-quarter pounds. Its dimensions are 11 by five by five and three-quarter inches and its cost is $365.

Still another pacemaker weighs 12 ounces, is two by four by one and one-eighth inches and costs $385.

Most first-class hospitals have some kind of artificial pacemaker today.

Pacemaker in Recovery Room

Dr. Charles A. Hufnagle, chief of cardiovascular surgery at Georgetown Hospital in Washington, D. C., says there is always an artificial pacemaker in the recovery room for Georgetown patients who might develop heart block after operations.

In an interview with Dr. Thomas W. Mattingly, chief of medical education at the Washington Hospital Center, and former chief of medicine and cardiology at Walter Reed Army Medical Center, he said that four points of value connected to the pacemaker are:

1. Establishing a suitable rhythm in a patient who has developed heart block involving the conductive tissues of the heart muscle.

2. In the management of heart block that develops at times as a result of cardiac surgery. Especially indicated, he said, is the repair of defects in the septa (dividing walls) between the heart cavities.

3. In cases where trauma, or injury, to special conductive tissues occurs.

4. In those conditions where for some reason there is complete stoppage of the heart.

One of these conditions of cardiac arrest can result from the use of the defibrillator, an electric device that shocks the fluttering heart out of its chaotic beat, but which may stop it entirely. Following defibrillation, the artificial pacemaker can restore the normal beat.

Recently in Washington a short circuit occurred in a swimming pool's underwater electric system and the life guard along with a ten-year-old swimmer died. This is the kind of death from cardiac fibrillation or arrest that could have been remedied if there had been a defibrillator and an artificial pacemaker at the pool.

"The important thing, however," Dr. Mattingly said, "is to keep the electric system in order so that the accident does not happen."

Another new method of resuscitation is the closed chest massage recently announced by Johns Hopkins that is being taught to firemen and others who may be called upon to give this kind of first aid without opening the chest.

Dr. Mattingly was asked what the outlook is for heart disease—the nation's number one killer.

"Our greatest hope is in the steady progress we are making," he said. "Nothing sensational is going to happen tomorrow. The heart patient's own intelligent care of himself, of his personal health, will be the greatest deterrent to heart attack. He must learn that he can't walk to the corner drugstore and get a pink pill that will cure his heart trouble."

Some heart patients live 15 or more years after a coronary occlusion such as President Eisenhower suffered in Denver in September, 1955. At that time the country was alarmed at the possibility of a recurrence that has not happened.

The reporter asked what the outlook for President Eisenhower's health is when his term of office ends next January.

In other words, how are his physicians going to keep him "down on the farm"

ARTIFICIAL PACEMAKER—An attendant attaches an electronic pacemaker to a patient at Walter Reed Army Medical Center. In case of a heart block, the pacemaker stimulates the heart back into action. The device costs more than $300.

writing his memoirs after all the stimulation of world travel and official life so necessary, apparently, to his well-being.

Dr. Mattingly looked enigmatically at the ceiling and said:

"I haven't the slightest notion that the President is going to sit still at Gettysburg and write his memoirs, nor would I advise it."

It is amusing in retrospect to consider all the predictions made about the President's outlook for this administration. One of them was that Vice President Nixon was only a heart beat away from the Presidency, and that it was most likely that he would enter into that office before President Eisenhower's term had ended.

With anti-coagulants and all the modern treatment given, not only to the President but to the ordinary man who has a heart attack, the number one killer may take its place down the line before another Presidential term of office is through. Starting a stopped heart will become a simple matter. Or, better yet, fewer hearts are going to stop.

Cases of heart block are few in comparison to other disturbances of heart rhythm associated with heart disease, which make heart trouble the first cause of death in the United States.

Arteriosclerotic heart disease, which includes atherosclerosis, the cause of more than half of all deaths in this category, includes also coronary insufficiency, myocardial infarction (coronary thrombosis) and other disorders.

In an article reprinted from the magazine Cardiovascular Disease Nursing, Dr. Mattingly discusses prophylaxis, or treatment.

He says: "Since the cause or causes of atherosclerosis are not known, specific measures of prevention are not yet available."

Among the many prophylactic measures recommended, he mentions diet, hormonal therapy, regulation of physical activity, emotional or mental stress, and inheritance factors.

Circumstantial Evidence

"There is still no definite proof," he says, "of the theory that arteriosclerosis has a dietary origin. During the past decade, considerable evidence has accumulated in support of this belief, but as far as human experiments are concerned, it is largely circumstantial evidence based upon the frequency of high fat diets with excess of fat or lipids in the blood (hyperlipemia), and, in turn, hyperlipemia with atherosclerosis."

Dr. Mattingly says that science is slowly but surely marching on toward the prevention and alleviation of heart disease.

"Therapy and procedures in the management of arteriosclerosis and arteriosclerotic heart disease are altered almost daily by our efforts to relate new theoretical and laboratory findings to clinical practice," he says.

"In doing so, at times we tend to forget or discard measures which have been thoroughly evaluated and of proven value. In our modern management, it is well to keep in mind the writing of Alexander Pope who, over 200 years ago, gave this good advice:

"'Be not the first by whom the new are tried;
Nor yet the last to lay the old aside.'"

• Science News Letter, 78:250 October 15, 1960

ENTOMOLOGY

Parasite of Pea Aphid Imported From India

See Front Cover

➤ NOW USED TO CONTROL damage of the pea aphid to leguminous crops in California is a small parasitic wasp, *Aphidius smithi*, imported from India. It was imported by the Entomology Research Division of the U. S. Department of Agriculture for propagation in the biological control insectaries at Albany and Riverdale, Calif.

Shown on the cover is an alfalfa leaf with mummified pea aphids containing the parasite pupa of the Indian wasp.

• Science News Letter, 78:251 October 15, 1960

TECHNOLOGY

Geometrical Fracture Puzzles Scientist

➤ A GEOMETRICAL PATTERN consisting of four spirals arranged symmetrically appeared unexplainably when titanium oxide fractured after being pressed for use as a refractory material.

This occurrence is reported by J. S. Jackson in the British science journal, Nature, 187:1104, 1960. He discovered this while working in the Research Laboratory of the Associated Electrical Industries, Ltd., in Rugby, England.

The formation of one spiral by the fracture can be explained satisfactorily. However, the formation of four spirals spaced so symmetrically cannot be explained.

• Science News Letter, 78:251 October 15, 1960

Do You Know

The nation's *traffic toll* for 1959 was estimated by the National Safety Council at between 37,500 and 38,000 deaths and 1.4 million disabling injuries.

Arson may be responsible for as much as 30% of the United States' yearly fire total.

Questions

ASTRONAUTICS—What is the total sun pressure on satellite Echo? p. 243.

METEOROLOGY—What type of clouds are being studied by the Missouri Ozarks weather team? p. 249.

VETERINARY MEDICINE—What is the yearly economic loss to farmers whose cattle have leptospirosis? p. 246.

Photographs: Cover, F. E. Skinner, University of California; p. 243, Chrysler Corporation; p. 245, University of Illinois; p. 247, Grumman Aircraft Engineering Corporation; p. 250, Signal Corps; p. 256, Pyro Plastics Corporation.

Books of the Week

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

ACCELERATORS: *Machines of Nuclear Physics*—Robert R. Wilson and Raphael Littauer—*Doubleday*, 196 p., illus., paper, 95¢. Clear, semi-technical explanation of the development of particle accelerators, from X-ray tube to huge synchrotrons.

AMERICAN STRATEGY FOR THE NUCLEAR AGE—Walter F. Hahn and John C. Neff, Eds.—*Doubleday*, 455 p., $1.45. Prepared for the Institute for American Strategy by the Foreign Policy Research Institute of the University of Pennsylvania.

APPROACHES TO THERMONUCLEAR POWER—R. F. Saxe—*Temple (Simmons-Boardman)*, 65 p., illus., $1.75. Monograph on fusion reactor, behavior of plasma at high temperatures, toroidal and mirror machines.

THE AUSTRALIAN ENVIRONMENT—G. W. Leeper, Ed.—*C.S.I.R.O. (Cambridge Univ. Press)*, 3rd rev. ed., 151 p., illus, maps, $6. Includes physical geography, climates, soils, water, vegetation, field crops and livestock.

THE BARNES AND NOBLE WORLD ATLAS—London Geographical Inst., Harold Fullard, Ed.—*Barnes & Noble*, 124 p., maps in color, paper, $1.95. Quick-reference handbook, includes statistical information.

BEAVER BUSINESS: An Almanac—Glen Rounds—*Prentice-Hall*, 110 p., illus. by author, $3. About the activities of beavers in streams and swamps.

BOTANY: A Textbook for Colleges—J. Ben Hill and others—*McGraw*, 3rd ed., 571 p., illus., $8.95. Thoroughly revised edition.

CERMETS—J. R. Tinklepaugh and W. B. Crandall—*Reinhold*, 239 p., illus., $9.50. Discusses physico-chemical aspects of cermets and describes properties, processing, testing and uses of both oxide- and carbide-base cermets.

ECONOMIC ATLAS OF THE SOVIET UNION—George Kish with Ian M. Matley and Betty Bellaire—*Univ. of Mich. Press*, 96 p., 65 maps, $10. General maps on vegetation, air transport, population, and sixty regional maps of agriculture, minerals, industries, transportation and cities.

ELEMENTARY MAP INTERPRETATION: Based on Maps of Nigeria, Ghana and Sierra Leone—J. H. Jennings—*Cambridge Univ. Press*, 62 p., illus., paper, $1.50. On the use of topographical maps.

ENSURING MEDICAL CARE FOR THE AGED—Mortimer Spiegelman—*Irwin* for the Pension Research Council, 280 p., $6.25. Assembles and interprets data on the complex problems of providing medical care for the aged.

EXPERIMENTAL PSYCHOLOGY: A Methodological Approach—Frank J. McGuigan—*Prentice-Hall*, 314 p., $6. Presents the more important techniques used by experimental psychologists.

FLIGHT FACTS FOR PRIVATE PILOTS—Merrill E. Tower—*Aero Pubs.*, 214 p., illus., $5; paper, $3.50. Includes chapter on altitude instrument flying.

FOREST AND SHADE TREE ENTOMOLOGY—Roger F. Anderson—*Wiley*, 428 p., illus., $8.50. General principles and detailed discussion of the more important forest insect species.

FROM IMMIGRANT TO INVENTOR—Michael Pupin, foreword by Freeman J. Dyson—*Scribner*, 396 p., paper, $1.45. Reprint of autobiography by the inventor of electric transmission line.

GEORGE WESTINGHOUSE—Henry Thomas—*Putnam*, 128 p., illus. by Charles Beck, $2.50. Biography for boys and girls.

THE GIANT GOLDEN BOOK OF MATHEMATICS: Exploring the World of Numbers and Space—Irving Adler, foreword by H. F. Fehr—*Golden Press*, 92 p., illus. by Lowell Hess, $3.95. Shows in picture and word how man applied his ability to reason with numbers to different fields of knowledge.

HANDBOOK OF MICROBIOLOGY—Morris B. Jacobs and Maurice J. Gerstein—*Van Nostrand*, 322 p., $8.50. Presents in tabular form data on characteristics of microorganisms, classification of bacteria and fungi, antibiotics and other reference tables.

THE HEALTH HUCKSTERS—Ralph Lee Smith—*Crowell*, 248 p., $3.95. The documented story of how misleading advertising persuades Americans to spend more than one billion dollars a year for foods, drugs and cosmetics that have no real benefit.

HYDRODYNAMICS OF OCEANS AND ATMOSPHERES—Carl Eckart—*Pergamon*, 290 p., $9. Approaches the problems of meteorology and oceanography through the systematic use of modern methods of mathematical physics.

INDUSTRIAL ARCHITECTURE: An Analysis of International Building Practice—James F. Munce—*Dodge, F. W.*, 232 p., illus., $14.75. Short history of the factory, followed by survey of postwar U. S., German and British factory design; specific sections on structure, materials, automation, fire protection and other aspects.

AN INTRODUCTION TO ANIMAL PHYSIOLOGY—W. B. Yapp—*Oxford Univ. Press*, 2nd ed., 423 p., illus., $4.95. Covers in an elementary way the whole range of animal, as distinct from human or general, physiology.

THE QUEST OF ISAAC NEWTON—Barbara and Myrick Land—*Garden City Bks.*, 56 p., illus. by Arthur Renshaw, $2.50. Newton's scientific ideas in picture-book presentation.

RADIOISOTOPES AND RADIATION IN THE LIFE SCIENCES: Second Inter-American Symposium on the Peaceful Application of Nuclear Energy,

(Continued on p. 254)

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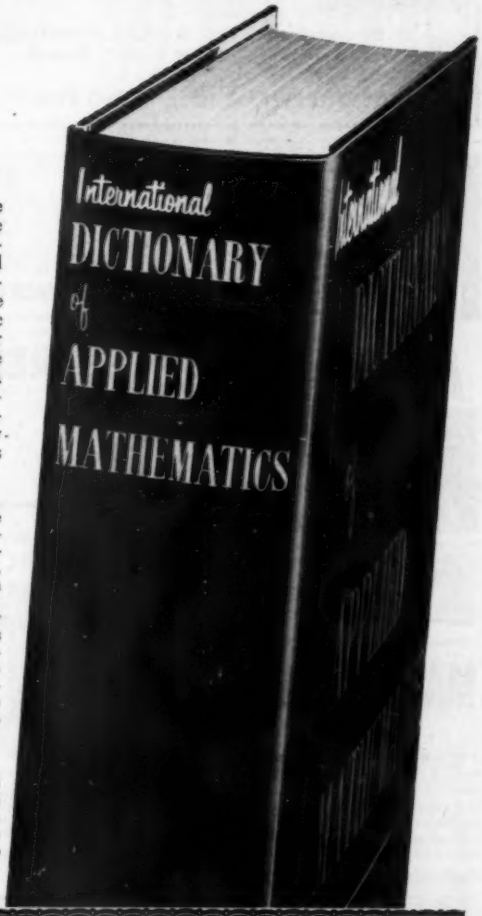

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Important Foreign Language Indices

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Books of the Week

(Continued from p. 252)

Buenos Aires, 1959—Helio Lopez, Chmn.—*Pan American Union*, 265 p., illus., paper, single copies free upon request direct to publisher, Div. of Science Development, Washington 6, D. C.

READINGS IN THE HISTORY OF AMERICAN AGRICULTURE—Wayne D. Rasmussen, Ed.—*Univ. of Ill. Press*, 340 p., illus., $6.50. Chronologically arranged excerpts start with what a farm worker was expected to accomplish during a day in 1625 and end with World Food Board proposal by FAO in 1946.

SCIENTISTS WHO CHANGED THE WORLD—Lynn and Gray Poole—*Dodd*, 164 p., illus., $3. Introduces young people to the work of creative and original scientists whose ideas changed the established beliefs of their time.

SEA BEARS: The Story of the Fur Seal—Fredericka Martin—*Chilton Co.*, 201 p., photographs, $3.50. About the Alaskan sea bears, the Aleutians who hunt them, and the fur trade.

SIGHT: A Handbook for Laymen—Roy O. Scholz—*Doubleday*, 166 p., illus., $3.50. To give the reader a broad non-technical view of the functioning of the eye in health and disease.

SMITHSONIAN TREASURY OF SCIENCE, Vols. I-III—Webster P. True, Ed.—*Simon & Schuster*, 1208 p., illus., boxed set of 3 vols. $15, Christmas price $12.95. Fifty articles from the annals of the Smithsonian Institution by some of the world's foremost authorities, covering almost every field of human knowledge.

STEREO HI-FI HANDBOOK—Joseph Marshall—*Arco*, 140 p., illus., $2.50. Tells the hobbyist how to choose and assemble high-fidelity equipment.

SYMPOSIUM ON FATIGUE OF AIRCRAFT STRUCTURES—Herbert E. Hardrath, Chmn.—*Am. Soc. for Testing Materials*, 138 p., illus., $4. Papers presented at Third Pacific Area National Meeting in San Francisco in 1959.

SYMPOSIUM ON SPECTROSCOPY — Emery H. Rogers and John B. Marlin, Co-Chmn.—*Am. Soc. for Testing Materials*, 245 p., illus., $7. Includes emission, X-ray, flame photometry, ultraviolet absorption, magnetic resonance and infrared spectroscopy.

THOMAS JEFFERSON AND HIS WORLD—Henry Moscow with Dumas Malone—*American Heritage (Golden Press)*, 154 p., 170 illus., $3.50. Presents beautifully the genius of Jefferson; includes his inventions.

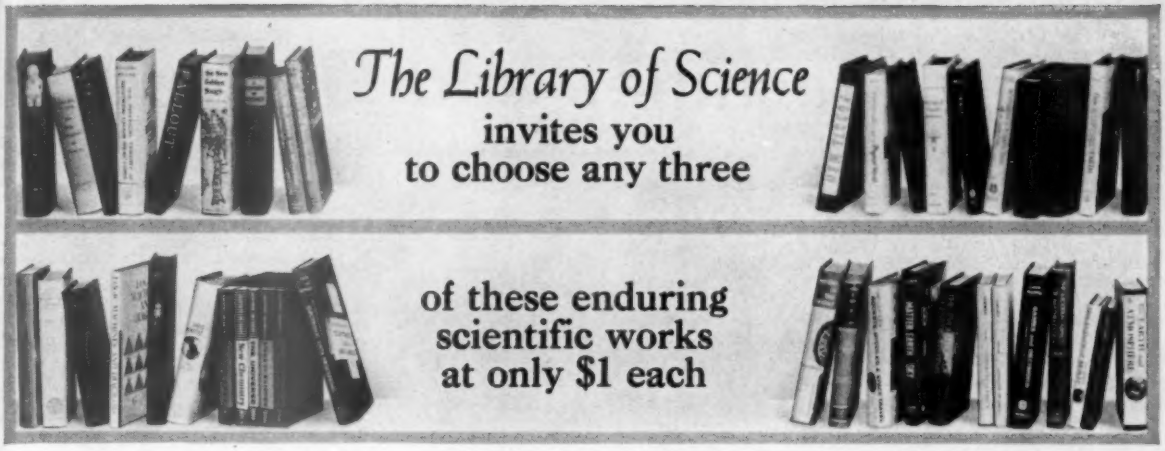
TREATISE ON INVERTERBATE PALEONTOLOGY, Part I: Mollusca 1—Raymond C. Moore, Ed.—*Univ. of Kansas Press*, 351 p., illus., $7.50. Comprehensive summary of knowledge concerning invertebrate fossil groups, results of investigations by specialists in many countries.

WHAT DOES A PARACHUTIST DO?—Wayne Hyde—*Dodd*, 64 p., photographs, $2.50. Shows youngsters the training of parachutist.

WILLIAM JAMES ON PSYCHICAL RESEARCH—Gardner Murphy and Robert O. Ballou, Eds.—*Viking*, 339 p., illus., $6. Collection of James's writings on telepathy, mediumship and survival after death.

WONDERS OF THE ANTHILL—Sigmund A. Lavine—*Dodd*, 64 p., illus. by E. H. Hart, $2.95. Handsome and informative book for boys and girls.

THE WORLD AROUND US—Jean Petrus—*Grosset*, 64 p., illus. by Pierre Leroy and Jean Steen, $2.95. Large-format illustrated geography book for boys and girls.



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New Machines and Gadgets

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DIAPER CLIPS hold diapers securely but cannot jab baby as safety pins might. To use, you push clip onto diaper and flip the clip closed. A spring holds it. The clips can be disassembled for cleaning.

• Science News Letter, 78:256 October 15, 1960

LADDER-TOP HAND RAIL extends 20 inches above the ladder to provide extra support and safety. Made of aluminum, the rail attaches easily to the top of wood or metal ladders and may be readily removed.

• Science News Letter, 78:256 October 15, 1960

TELEPHONE SCRAMBLER, held against a telephone handset, turns ordinary speech into gibberish for secret conversation. Only a second scrambler at the other end of the line can turn the gibberish into normal speech again. Special scrambler devices have been used before, but the manufacturer claims this portable, transistorized device is the first production model for business and law enforcement agencies.

• Science News Letter, 78:256 October 15, 1960

SHIP MODELS of plastic, seen in the photograph, form a new hobby kit. The series of four includes the Constitution, Mayflower, Santa Maria, and a Barbary pirate ship. Front panel of each box is a 3½-inch by 5-inch pop-out picture of the

7-inch long ship for use as wall or desk decoration. Each kit contains plastic sails and a history of the ship.

• Science News Letter, 78:256 October 15, 1960

IMPROVED FOLDING RULE is marked not only in inches but in feet and inches. At 16 inches, for instance, there is the notation "1F 4"—one foot, four inches. The six-foot wood rule has stud markings on 16-inch centers. A name plate and set of initials will personalize each rule.

• Science News Letter, 78:256 October 15, 1960

BAR-TYPE SWINGING DOORS are cut to look like a coffee pot, a cup of tea, a sugar bowl, a garden lamp or a Chinese lantern. Because they are not full doors, they provide some privacy without adding a "closed-in" feeling to a room. They are made of mahogany or birch veneer, ready for finishing.

• Science News Letter, 78:256 October 15, 1960

LEG SUPPORT features an adjustable, vinyl cushion on a brass or wrought iron base. The support turns any chair into a legs-up lounger, but may be folded and stored when not in use. The cushion is detachable for use as a back rest or as a pad at outdoor events.

• Science News Letter, 78:256 October 15, 1960

POOL ENCLOSURE for outdoor pools extends your swimming season by keeping breezes out but letting sun in. Shaped like a quonset hut, the enclosure has an aluminum frame, easily assembled and disassembled, with tension cables that firmly hold down a transparent plastic cover.

• Science News Letter, 78:256 October 15, 1960

Nature Ramblings

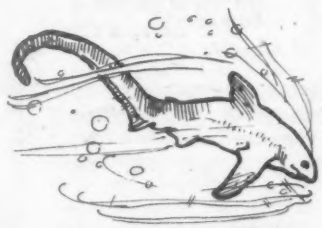
THE SEA WAS CALM, and the boat scarcely rocked with the long, low swells. A few hundred feet away, though, the smoothness of the water was broken by a mass of silvery points glinting in the sunshine—a school of fish swimming near the surface. The fishermen jumped into their dory, ready to set a large net around the swarming fish.

But before the last line was cast off, the men heard a mighty splashing on the water. Looking up, they saw the sea literally churning where the school of fish had been. Water flew in all directions. Small fish leaped—or were hurled—in all directions.

In a few seconds this underwater commotion had ceased, and once again the surface was calm. But the school of small fish had gone. In their place were numerous dead fish floating on the water, and ominous fins projecting above the surface.

The fishermen had witnessed the attack of thresher sharks. While their day's fishing had been ruined by these monsters, they were glad the sharks had struck before they had set their net and not afterwards. A few blows from the sharks' tails would have reduced the seine to worthless ribbons.

Thresher Shark



All sharks characteristically have a tail in which the upper lobe is considerably more developed than the lower lobe. This is termed a "heterocercal" tail, in contrast trast with the "homocercal" tail with more or less equal lobes as in the true, bony fishes.

Supposedly, the enlarged upper tail lobe acts as a counterweight against the shark's heavy forebody. The bony fishes generally have a more equal distribution of their weight throughout the body.

Whatever the reason behind the oversized upper tail lobe of a shark, it does act as an extremely effective oar with which the big fish sculls itself through the water.

The thresher shark, with its extreme heterocercal tail, may grow to 15 feet or so in length, more than half being tail! This outsize appendage is used by the thresher shark to flail the water, stunning or killing its prey which it then devours at leisure.

Other sharks seem to run to extremes, too. There is a tendency among the tribe for the eyes to be placed far to the side of the head, as if to increase the lateral and backward field of vision. This trend almost reaches the point of absurdity in the hammerhead sharks, in which the eyes are found perched on the ends of a broad head. But it is not so absurd as it may seem, for the hammerheads—like the threshers—are effective killers. —HORACE LOFTIN

• Science News Letter, 78:256 October 15, 1960